AOSP – Functional Demonstration

AOSP FY-02
Program Review

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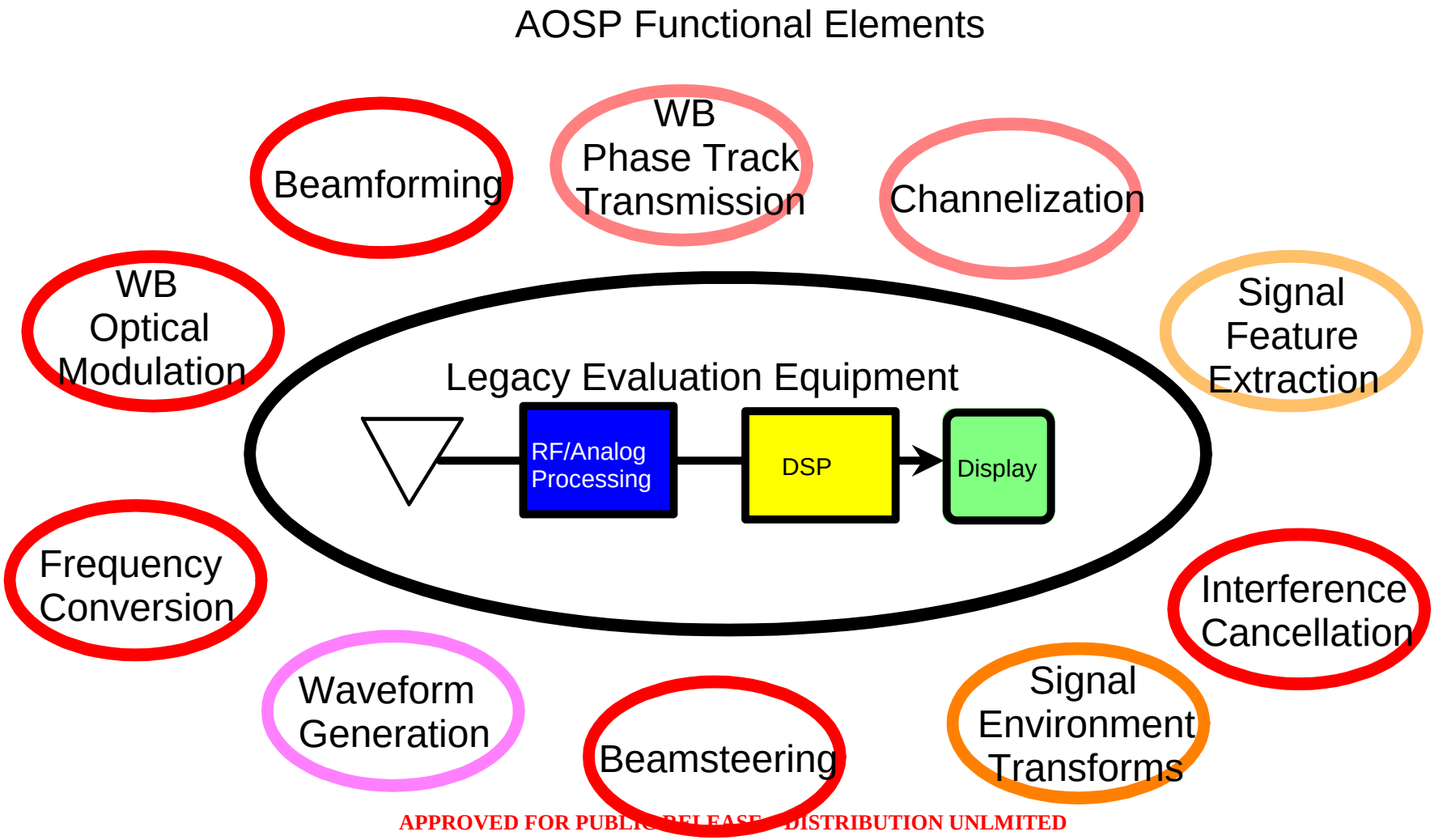
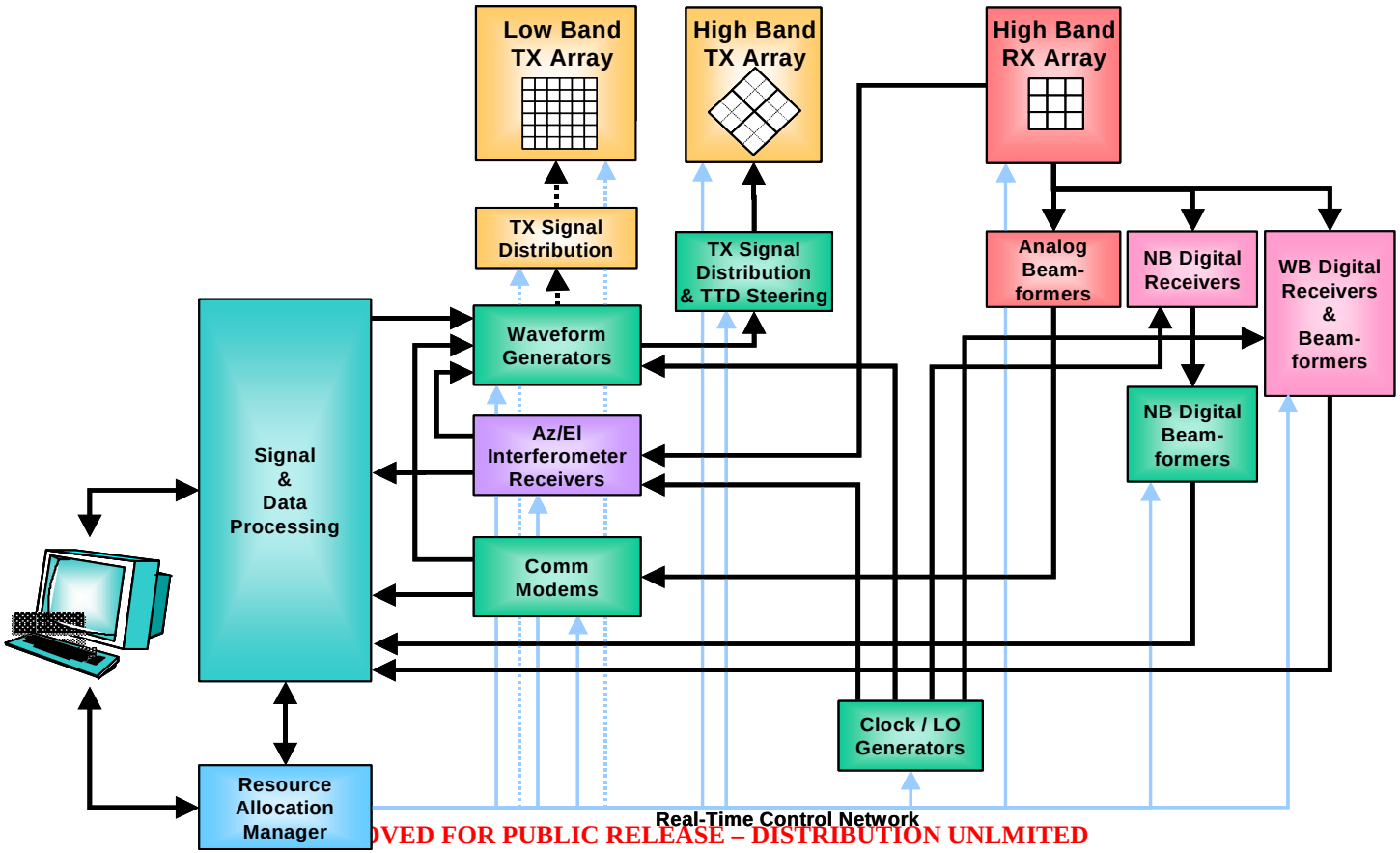
Task Objective

Establish system performance targets for AOSP developments and provide a means to perform AOSP assembly test and evaluation in a system Function evaluation environment

AOSP Functional Demonstration Concept



Legacy Evaluation Equipment Architecture



AOSP Functions

- Antenna Beam Control
- Wideband Signal Transmission
- Spectral Processing
- Signal Generation
- Transform Processing

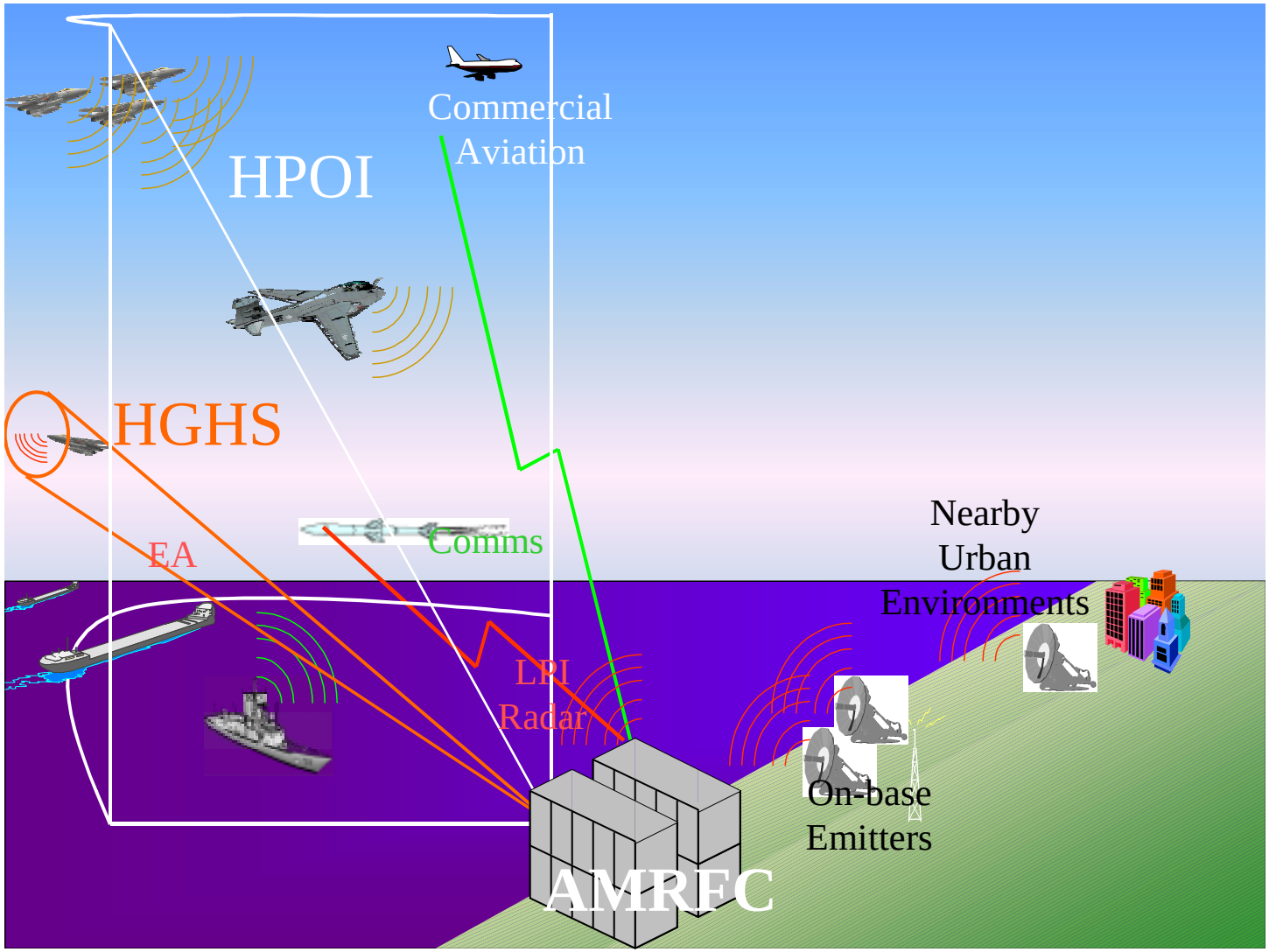
System Functions

- **Radar**
  - Volume Search
  - Threat Ballistic Missile Defense

- **Communications**
  - Satellite
  - Tactical

- **Electronic Warfare**
  - Electronic Support
  - Electronic Attack

EW Function



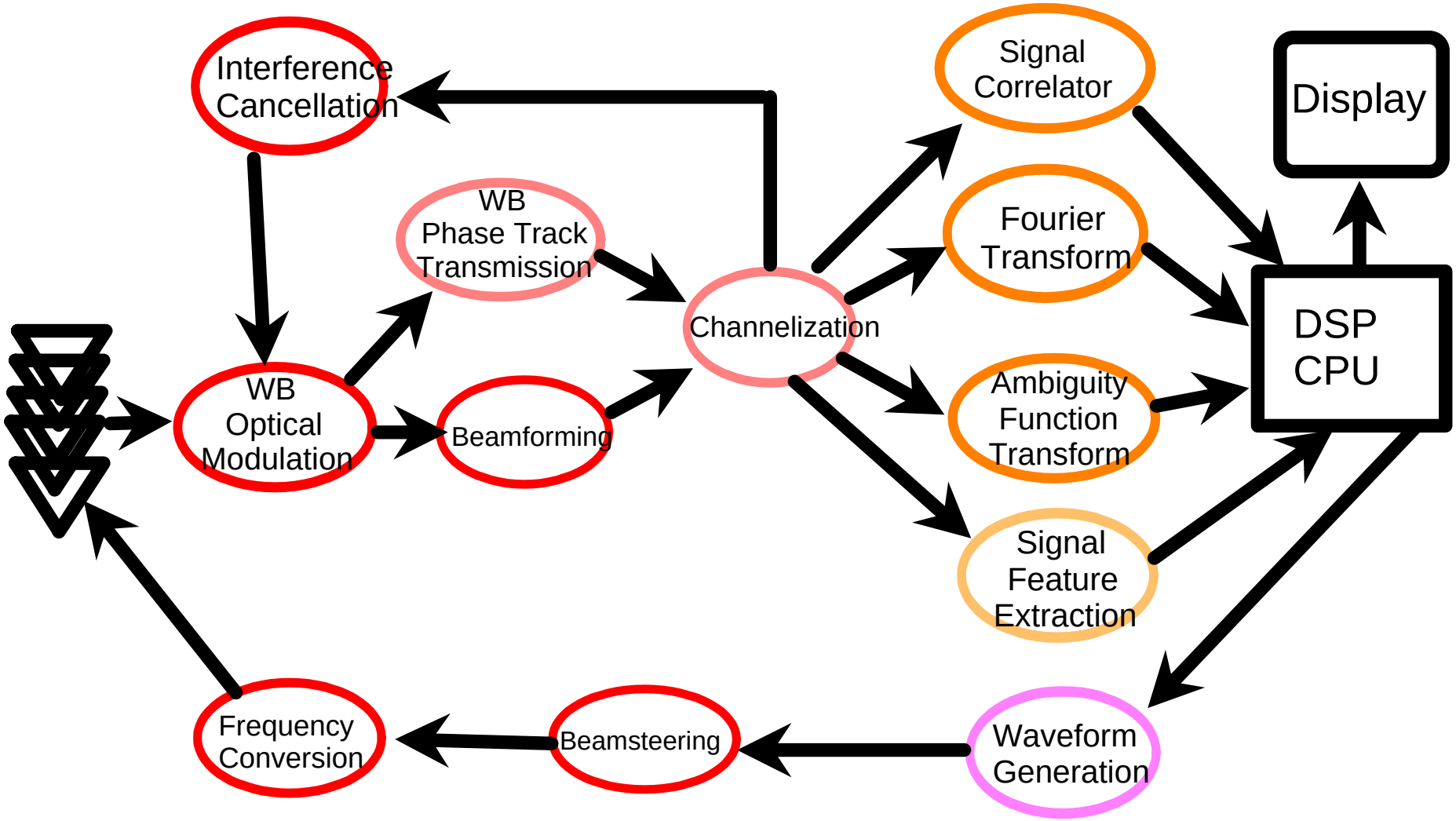
Electronic Warfare

- **Electronic Support**
  - High Probability of Intercept (HPOI)
  - High Gain High Sensitivity (HGHS)
  - Precision Direction Finding (PDF)

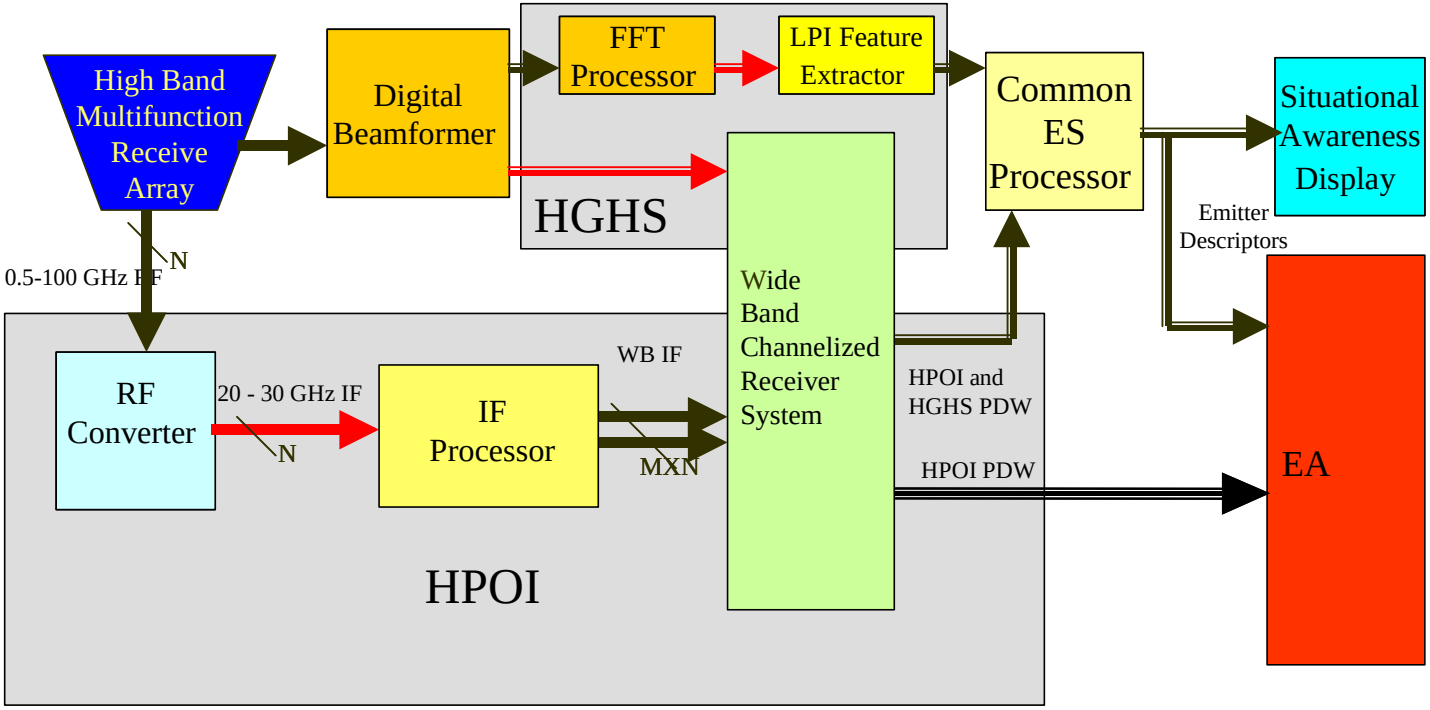
- **Electronic Attack**
  - Counter Surveillance
  - Counter Targeting
  - Terminal Threat Countermeasures

ES Requirements

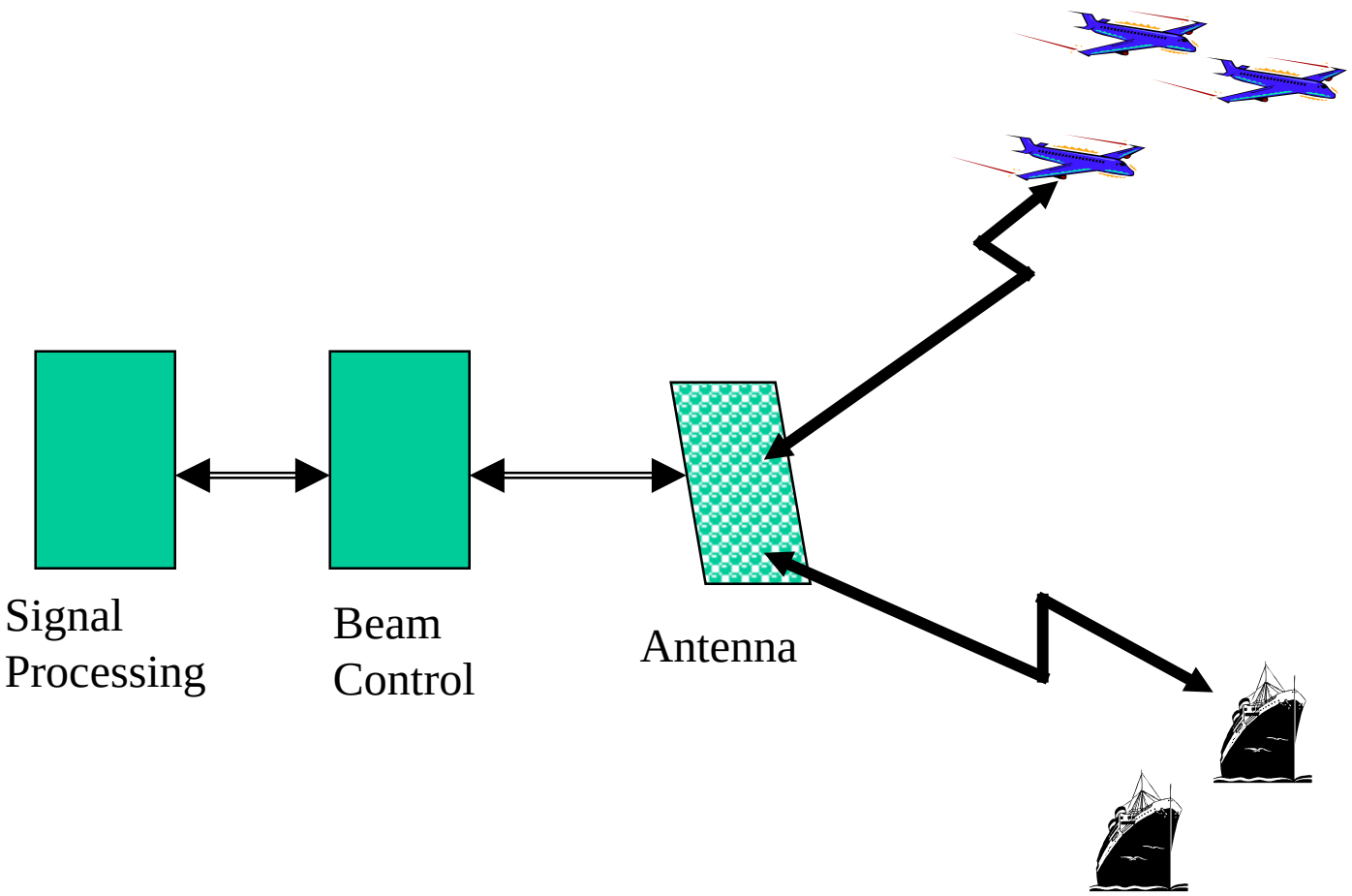
Feature	Quantization
Spatial Coverage	Isotropic
Instantaneous Coverage	
HPOI	Isotropic
PDF	Isotropic
HGHS	5^{o} Beamwidth
Spectral Coverage	0.5 to 100 GHz
Instantaneous Bandwidth	10 GHz
Spectral Channelization	
- Pulse Detection	20 – 100 MHz
- FMCW Detection	1 MHz
Signal Frequency Analysis	
- Pulsed Freq.	1 MHz
- SEI	10 KHz
- FMCW	100 KHz
Bearing Resolution	0.1 deg



Projected ES Block Diagram



Radar Function



Radar Functions

- Target Detection
- Target Tracking
- Target Identification
- Weapons Control
- Intercept Avoidance

Radar Spectral Usage

- **L Band**
  - Shipboard Volume Search
  - Ground Control Intercept
  - Threat Ballastic Missile Defense

- **S Band**
  - Shipboard Horizon Search
  - Shipboard Target Tracking
  - Shipboard Targeting

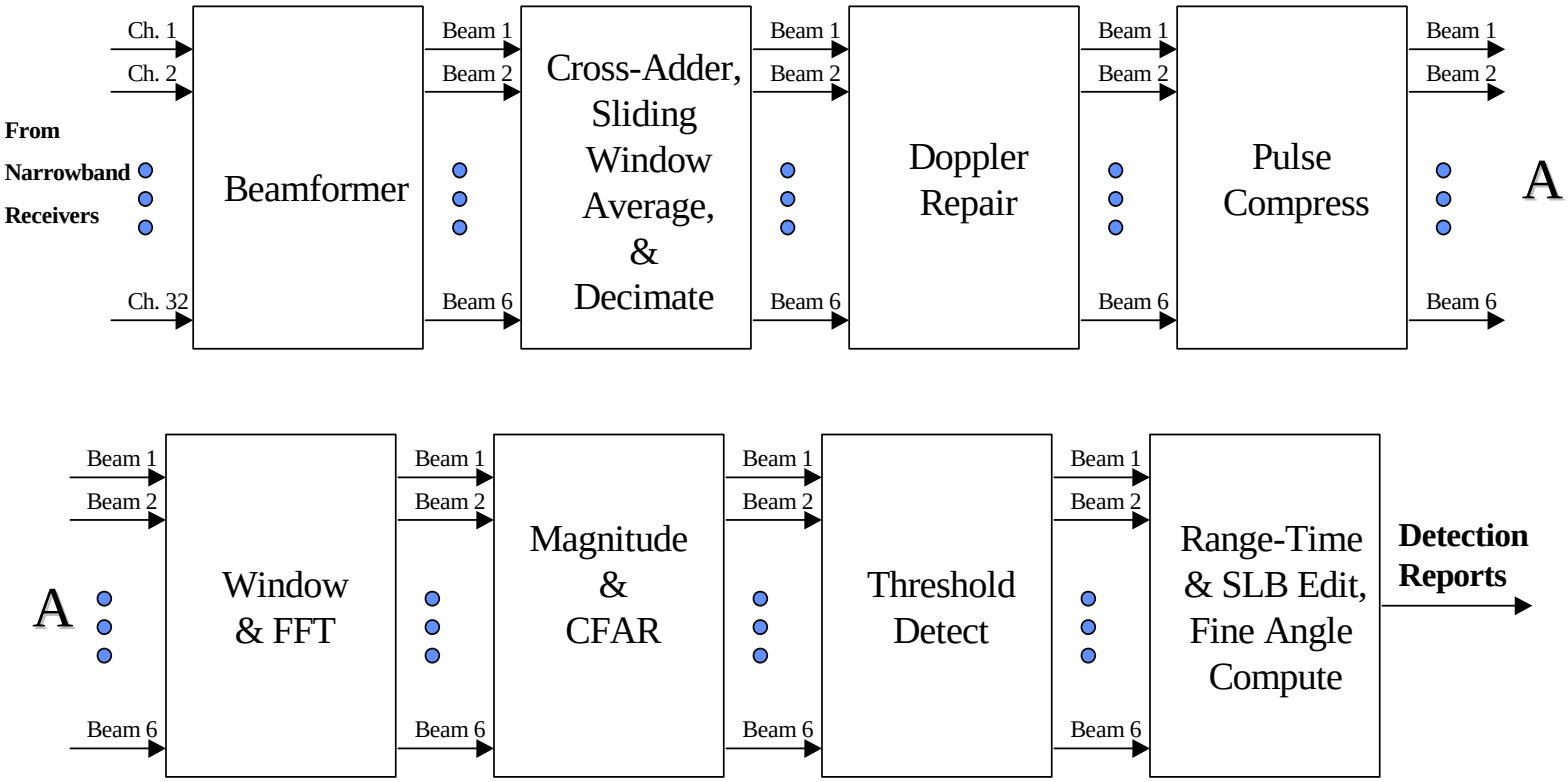
- **X Band**
  - Shipboard Horizon Search
  - Airborne Intercept
  - Weapons Guidance

- **K Band**
  - Instrument Landing
  - Weapon Guidance

Radar Requirements

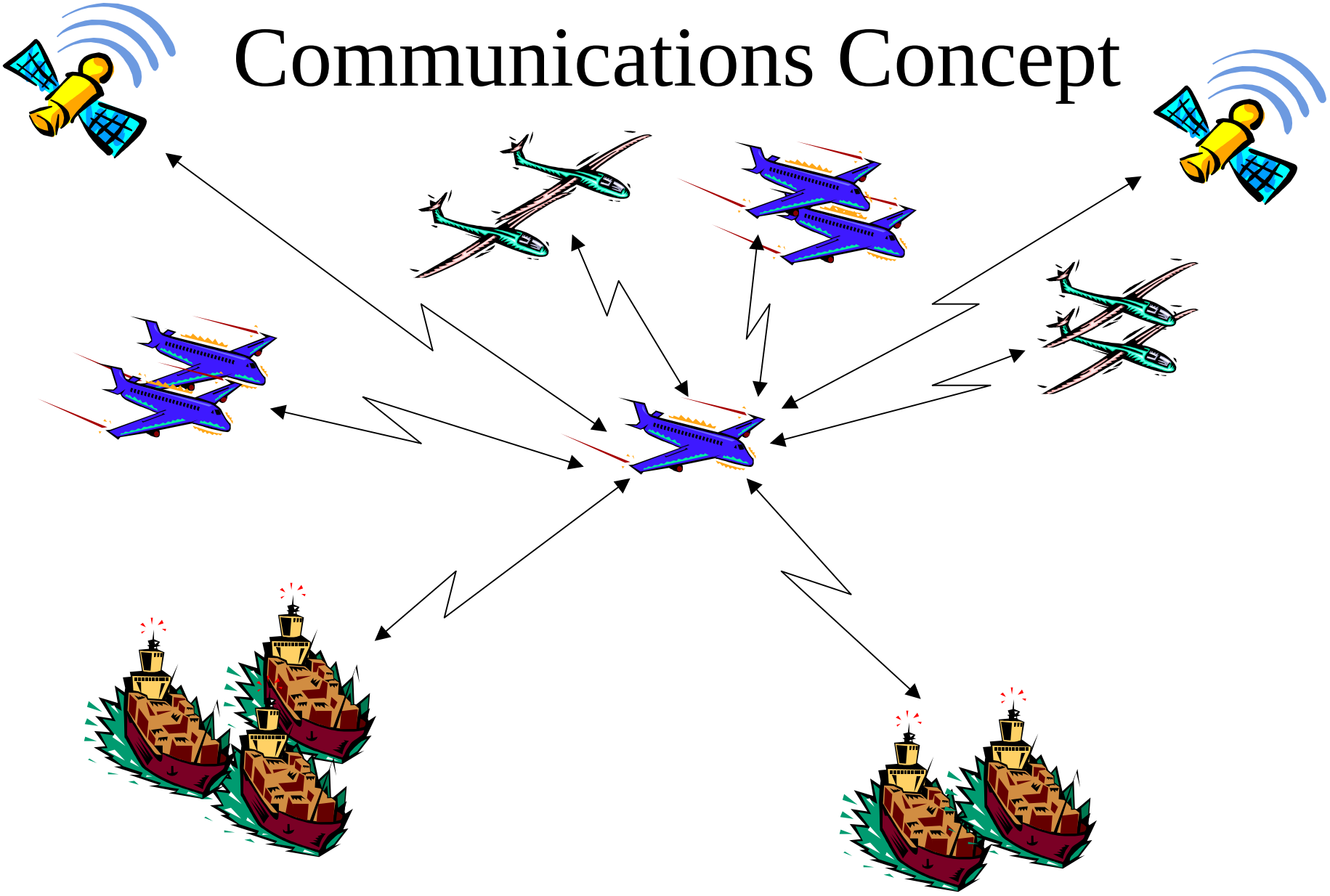
Feature	**Quantization**
Spatial Coverage	Isotropic
Instantaneous Spatial Coverage	1^o to 5^o
Spectral Range	0.5 to 100 GHz
Instantaneous Bandwidth	
- Volume Search	10 MHz
- ISAR	1.0 GHz
- LPI	10 GHz/10% BW
Signal Frequency Analysis	
- Clutter Rejection	1 MHz
- Velocity Measurement	500 Hz Doppler Resolution
- Imaging	10 Hz ISAR Resolution

VSR Function Signal Processing Chain



Communications

Communications Concept

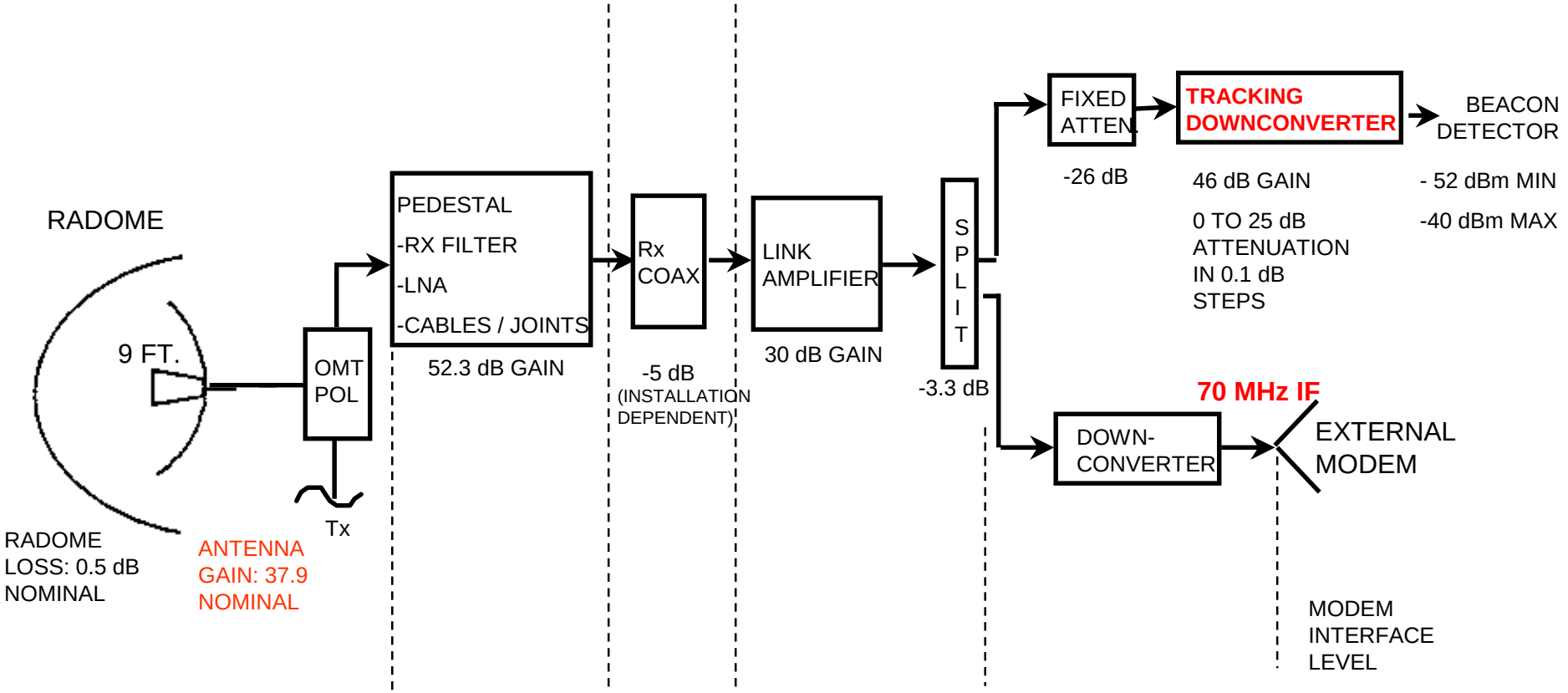


Communication Channels

SATCOM
INMARSAT
Challenge Athena
SHF (DSCS)
GBS
EHF Rx

LOS/AIR
CEC
IFF
JTIDS

SATCOM Rx Chain Block Diagram



Communications Requirements

Feature	**INMARSAT**	**Challenge Athena**	**JTIDS**
Spatial Coverage	Hemispherical	Hemispherical	Hemispherical
Instantaneous Coverage	15^{o}	1.5^{o}	Isotropic
G/T	-4dB.^{o}K	16 dB/^{o}K	
Spectral Coverage	1.5 to 1.7 GHz	4.0 to 6.0 GHz	0.9 to 1.3 GHz
Instantaneous Bandwidth	12 MHz	36 MHz	3.0 MHz
Modulation	DPSK,QPSK	PSK,FSK	PSK,TDMA,FH

AOSP-FD Tasking

Task 1. System Requirement Definition
Task 2. Optical technology assessment
Task 3. AOSP test plan
Task 4. AOSP component performance requirements definition
Task 5. AOSP ICD generation
Task 6. AOSP component development review
Task 7. AOSP System Function Integration and Test
Task 8. AOSP Functional Evaluation Assessment

Accomplishments

AOSP program support provided proposal evaluation and recommendations for award. In addition, the program plan for executing the AOSP-FD was generated and provided to DARPA.

Progress

System requirement projections for Radar and Electronic Warfare have been researched from recent analysis and projections.
The Radar requirements include Volume Search, Threat Ballistic Missile Defense, and Low Probability of Intercept functions.
Electronic Warfare requirements include High Probability of Intercept, Precision Direction Finding, High Gain High Sensitivity, and Specific Emitter Identification functions.

AOSP – FD Schedule